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Improvements in cladding panel facade systems for buildings

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### ABSTRACT

A method for producing a cladding panel facade structure having a plurality of cladding panels (24) installed onto a building facade, comprising:

- (a) mounting to the building facade a subframe assembly (10) including a plurality of vertically aligned subframe members (12) and a plurality of horizontally aligned subframe members (14),
- (b) fixing to the subframe assembly (10) a plurality of fastening means (18) adapted to detachably connect the cladding panels (24) to the subframe assembly (10),
- (c) applying an adhesive (28) having sealant properties to the subframe assembly (10) at locations thereon adapted to bond the cladding panels (24) to the subframe assembly (10),
- (d) positioning the plurality of cladding panels (24) on the subframe assembly (10) so that they are detachably connected thereto by the plurality of fastening means (18), whereby repositioning of any one or more of the cladding panels (24) may be carried out, and so that, over time, the adhesive (28) will bond the cladding panels (24) to the subframe assembly (10).



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TO BE COMPLETED BY THE APPLICANT

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INVENTION TITLE: IMPROVEMENTS IN CLADDING PANEL  
FACADE SYSTEMS FOR BUILDINGS

DETAILS OF ASSOCIATED  
PROVISIONAL APPLICATION NO: PP 5544 - 28 August 1998 - AUSTRALIA

The following statement is a full description of this invention including the best method of performing it known to us:-

The present invention relates to the application of cladding panels to buildings and, in particular, to the application of weather resistant cladding panels to the exterior facade of buildings in a manner whereby they may be  
5 easily realigned, if required, and provide a decorative appearance, even after realignment.

In the building industry, there are numerous materials and methods for providing a decorative or aesthetically pleasing appearance to exterior walls of buildings.

10 One such approach is to use an aluminium based composite panel, known by the trade mark ALPOLIC, but this material is expensive and its method of fixing is time consuming and cumbersome.

Another, less expensive, approach has been to use acrylic painted compressed fibrous cement panels. However, such acrylic painted panels  
15 have conventionally been fixed to buildings with screws that are applied to the external or visible surface of the panel and countersunk into the panel so as to leave a depression which is then filled with a filler substance. The appearance of the panel may be unsightly as a result of this fixing method. More recently, colour coated screws have been used to avoid both countersinking the screws  
20 and the subsequent use of a filler substance. However, the use of screws generally is discouraged as, in the event that the panel needs to be realigned and the previous screws removed and new screws applied, the previous screws will leave signs of their presence, and the requirement of having to remove the old screws and apply the new screws makes the process of  
25 realigning the panel a laborious one.

It is an object of the present invention to provide an improved method for applying a plurality of cladding panels to the exterior facade of a building so that their manner of fixing is concealed from view and they may be realigned

quickly and easily, if required, while at all times providing a decorative or aesthetically pleasing appearance.

It is another object of the present invention to provide an improved cladding panel facade structure for a building that is easy to install and realign,  
 5 if required, and is decorative or aesthetically pleasing.

According to the invention, there is provided a method for producing a cladding panel facade structure having a plurality of cladding panels installed onto a building facade, comprising:

- 10 (a) mounting to the building facade a subframe assembly including a plurality of vertically aligned subframe members and a plurality of horizontally aligned subframe members,
- (b) fixing to the subframe assembly a plurality of fastening means adapted to detachably connect the cladding panels to the subframe assembly,
- 15 (c) applying an adhesive having sealant properties to the subframe assembly at locations thereon adapted to bond the cladding panels to the subframe assembly,
- 20 (d) positioning the plurality of cladding panels on the subframe assembly so that they are detachably connected thereto by the plurality of fastening means, whereby repositioning of any one or more of the cladding panels may be carried out, and so that, over time, the adhesive will bond the cladding panels to the subframe assembly.

Preferably, the positioning step (d) is initiated by positioning a first row of  
 25 cladding panels to the bottom of the subframe assembly.

Preferably, after the first row of cladding panels is positioned, one or more backing strips is inserted behind the top edge of the first row of cladding panels and bonded to the subframe assembly with an adhesive.

5 It is also preferred that a second and subsequent rows of cladding panels are consecutively positioned to the subframe assembly in ascending row order, and one or more backing strips are inserted behind the top edge of each row of cladding panels when so positioned to the subframe assembly.

10 After the cladding panels are positioned on the subframe assembly, any spaces extending vertically or horizontally between the cladding panels are preferably filled with foam adapted to harden over time and then sealant is applied over the hardened foam.

In order that the invention may be readily understood and put into practical effect, reference will now be made to the accompanying drawings, in which:-

15 Fig. 1 is a perspective view of a preferred subframe assembly installed on the exterior wall of a building as a first step in a method for applying a plurality of cladding panels to a building according to a preferred embodiment of the present invention,

20 Fig. 2 is a side elevational view of a first portion of the subframe assembly of Fig 1 to which is attached an adjacent pair of fasteners for a cladding panel in a further step of the preferred method of the invention,

25 Fig. 3 is a side elevational view of the subframe assembly portion of Fig 2 to which is located a cladding panel and a backing strip in a further step of the said method,

Fig. 4 is a front elevational view of a second portion of the subframe assembly of Fig 1 to which is attached a single fastener for a

cladding panel, showing adhesive/sealant being added in a further step of the said method,

Fig. 5 is a front elevational view of a third portion of the subframe assembly of Fig 1 to which is attached a plurality of adjacent pairs of fasteners for a cladding panel, showing adhesive/sealant having been added in a further step of the said method,

Fig. 6 is a front elevational view of the subframe assembly portion of Fig 2, showing a protective film being removed from a fastener in a further step of the said method,

Fig. 7 is a side elevational view of a fourth portion of the subframe assembly of Fig 1 to which is attached a plurality of adjacent pairs of fasteners for a cladding panel, showing a cladding panel being positioned thereon in a further step of the said method,

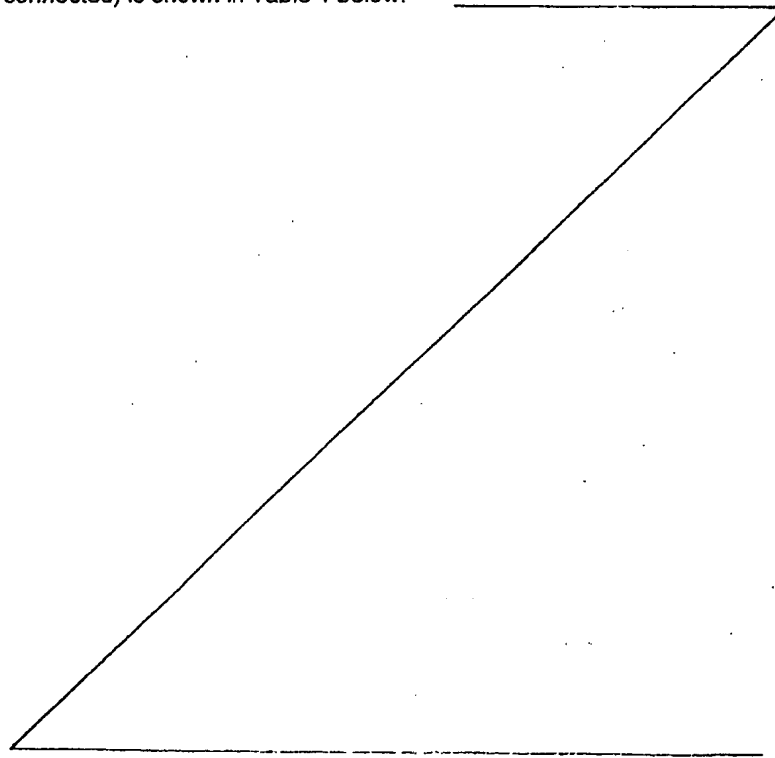
Fig. 8 is top elevational view of the portion of the subframe assembly showing a foam backer rod having been inserted through a vertical joint between the panels and a sealant/adhesive having been applied thereover in a further step in the said method,

Fig. 9 is a side elevational view of a portion of the subframe assembly showing a foam bond breaker having been inserted through a horizontal joint between the panels and a sealant/adhesive having been applied thereover in a further step in the said method.

The subframe assembly 10 shown in Fig 1 is fixed to the exterior wall of a building by conventional means specific to the building's structure and design, and consists of a plurality of vertically aligned, stainless steel, top hat sections 12 interconnected as shown with horizontally aligned, metal, cross members 14 or wall mounted purlins.

The cross members 14 are arranged so that along any one horizontal line thereof there are control joints 16 that separate adjacent cross members 14. The positions of the control joints 16 in the subframe assembly are such that they will correspond with the positions of control joints between adjacent cladding panels when the cladding panel facade is fully assembled.

The maximum span of the top hats for different wind pressures and for different top hat spacing (i.e. distance between vertically adjacent top hat sections), when a top hat section is required to extend over one, two or three spans (defined by the number of cross members to which the section is connected) is shown in Table 1 below.



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TABLE 1 MAXIMUM SPAN OF TOP HAT PROFILE.

Design Wind Pressure kPa	Top Hat Over Single Span Only		Top Hat Continuous Over Two Spans		Top Hat Continuous Over Three Spans	
	Top Hat Spacing 450mm	Top Hat Spacing 600mm	Top Hat Spacing 450mm	Top Hat Spacing 600mm	Top Hat Spacing 450mm	Top Hat Spacing 600mm
Maximum Span of Top Hat Profile						
Up to 0.75	1950	1750	2450	2150	2400	2200
1.0	1750	1600	2150	1850	2200	2000
1.5	1550	1400	1750	1500	1900	1700
2.0	1400	1250	1500	1300	1700	1450
2.5	1300	1200	1350	1200	1500	1300
3.0	1200	-	1250	-	1400	-
4.0	1050	-	1050	-	1200	-

After the top hat sections 12 are installed, the protective film 17 that overlays the uppermost surface of the top hat sections 12 is peeled off to expose the metal surface.

As shown in Figs 2 and 6, dual-lock ("VELCRO" type) fasteners 18 by the 3M company are then firmly fixed firstly to each top hat section 12 that supports adjacent edges of panels as adjacent pairs separated by 10mm across and, secondly, to each top hat section 12 that comprises an intermediate support for panels as singles. There is allowed a maximum distance of 300mm between each single fastener and between each pair of fasteners along each section 12. The fasteners 18 are square in shape (25.4mm by 25.4mm) and should be positioned such that, when the cladding panels 24 are affixed thereto, each panel 24 will extend about 50mm above the highest point of each pair of fasteners 18 so as to allow for the insertion of a horizontal backing strip 26 as shown in Fig 3. Each fastener 18 has an innermost mating part that is firmly fixed through adhesive on a first backing surface thereof to the outermost surface of the top hat section, and an outermost mating part that has an outer surface of adhesive protected by a peelable film. The two mating parts are detachably connected by means of the well known "hook and loop" type action. The dual-lock fasteners may be substituted for "VHB" double sided tape also manufactured by the 3M company.

As shown in Fig 4, a single continuous bead 28 of an adhesive/sealant (such as Dow Corning 795 polyurethane adhesive/sealant) is then applied through the vee notch in the nozzle of dispenser 30 along the outermost surface of each section 12 that comprises an intermediate support. A double bead 32, shown in Fig 5, of such sealant is continuously applied on top hat

sections 12 that support adjacent edges of panels 24 (i.e. control joints between panels).

The protective film 20 of each fastener 18 is then peeled off as shown in Fig 6 to expose the adhesive surface on the outermost mating part of the fastener.

The panel 24 is then positioned as shown in Fig 7 in the required manner on the fasteners 18 so that the outermost mating part of each fastener 18 fixes strongly to the rear surface of the panel 24. If any panel 24 needs to be realigned, the panel 24 together with the outermost mating part of each fastener 18 that is fixed to the rear of the panel, is pulled from the top hat sections 12 that support the panel, thereby leaving the innermost mating part of each said fastener 18 fixed firmly to the said top hat sections. Realignment of the panels 24 may thus occur by slight adjustments in the relative positioning of the "hook and loop" mating parts of each fastener 18 on each of the top hat section 12 and panel 24. In connecting the panels 24 to the subframe assembly 10, a first row of panels 24, starting with the bottom row, is initially connected to the subframe assembly 10.

The backing strips 26 may now be inserted behind the top edge of the bottom row of panels 24 and connected against the top hat sections 12 with the same sealant/adhesive as used before (refer to Fig 3).

The next row of panels 24 above the bottom row is then connected to the subframe assembly 10, and the process is repeated in ascending row order until all the panels are connected to the subframe assembly 10.

A foam backer rod 34 is then inserted in the vertically extending spaces between adjacent panels 24 and lodged between the adjacent pair of fasteners 18 as shown in Fig 8. A thin foam bond breaker 36 is also inserted in the

horizontally extending spaces between adjacent panels 24 and lodged against the backing strip 26 as shown in Fig 9.

5 All of the spaces (both vertical and horizontal) between adjacent panels are then filled with the same sealant/adhesive as used before, with any unsightly excess being smoothed off to leave a neat join 38.

10 The cladding panels are preferably those known by the trade mark VITRE PANEL, which are a polyurethane coated, compressed fibrous cement panel. The rear surface of the panels are preferably treated with a UV curable acrylate resin sealer that penetrates the panel fibres and causes them to interlock in such a way as to form a solid and compact rear surface that is strong enough to withstand tearing forces on the panel rear surface when the panel is pulled off the subframe assembly during any realignment. In order for the panel to be pulled from the subframe assembly, the adhesive grip of the outer mating part of the fastener to the rear surface of the panel is of greater strength than the grip of the hooks to the loops in the fastener. If the rear surface of the panel were not strengthened as mentioned above, then the action of pulling the panel from the subframe assembly may cause the panel fibres which are connected to the outer mating part of the fastener to be torn and the outer mating part to lose its grip on the panel, thereby preventing that fastener from contributing to any panel realignment, unless adhesive is used to fix the outer mating part back onto the panel at or near its original position. The UV acrylate resin sealer on the rear panel surface is also applied to front or exterior surface of each panel and acts as an undercoat for the polyurethane coating.

25 It is apparent from the aforementioned that the cladding panel fastening system of the present invention provides an improved concealed fix appr

to fixing cladding panels to buildings and allows for positional adjustment during application.

Various other modifications may be made in details of design and construction without departing from the scope and ambit of the invention.



THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:-

1. A method for producing a cladding panel facade structure having a plurality of cladding panels installed onto a building facade, comprising:
  - (a) mounting to the building facade a subframe assembly including a plurality of vertically aligned subframe members and a plurality of horizontally aligned subframe members,
  - (b) fixing to the subframe assembly a plurality of fastening means adapted to detachably connect the cladding panels to the subframe assembly,
  - (c) applying an adhesive having sealant properties to the subframe assembly at locations thereon adapted to bond the cladding panels to the subframe assembly,
  - (d) positioning the plurality of cladding panels on the subframe assembly so that they are detachably connected thereto by the plurality of fastening means, whereby repositioning of any one or more of the cladding panels may be carried out, and so that, over time, the adhesive will bond the cladding panels to the subframe assembly.
2. The method of Claim 1 wherein the fastening means comprise hook and loop fasteners or double sided tape.
3. The method of Claim 1 wherein the positioning step (d) is initiated by

positioning a first row of cladding panels to the bottom of the subframe assembly.

Dated this 19 day of August, 1999

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Fig. 1

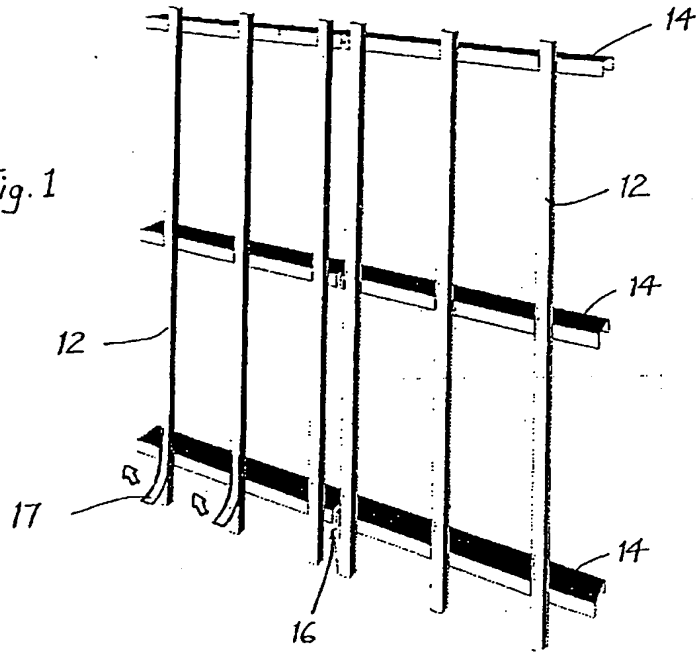


Fig. 2

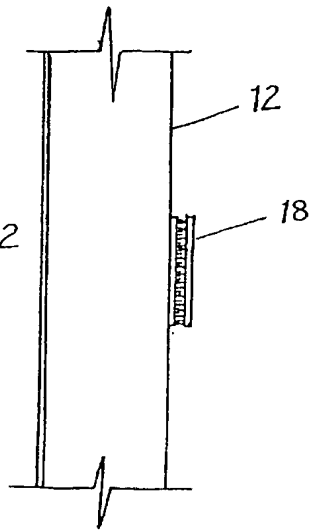
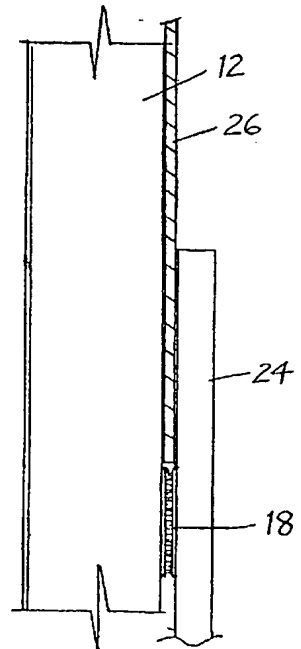
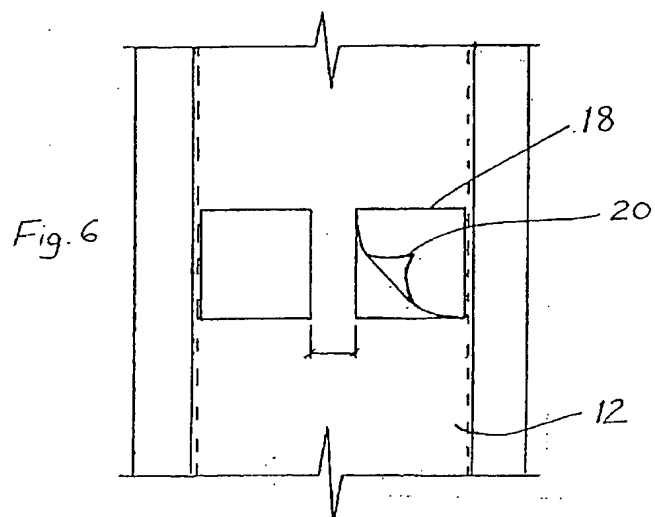
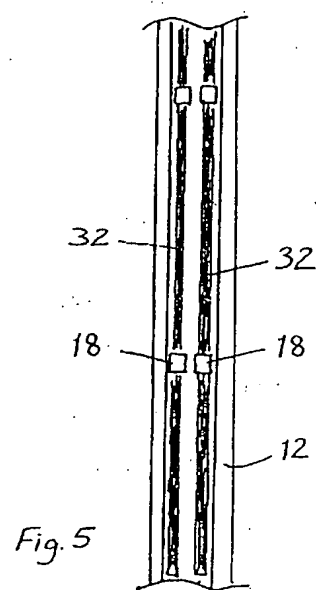
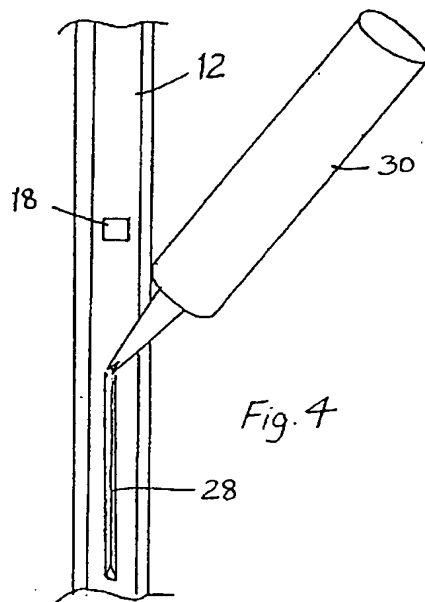


Fig. 3





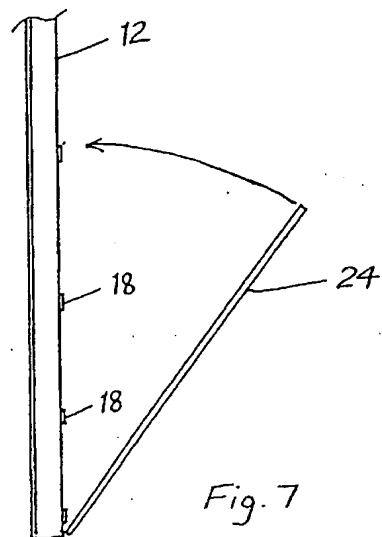


Fig. 7

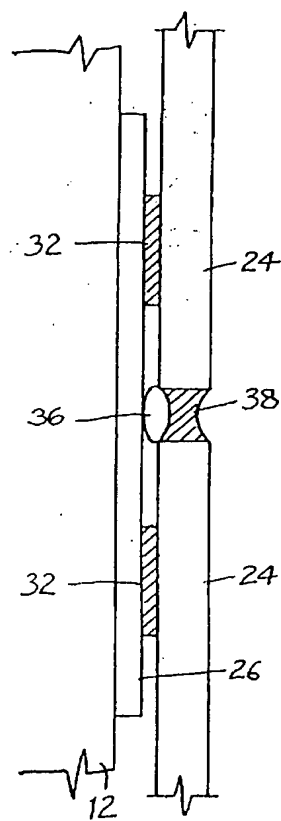


Fig. 9

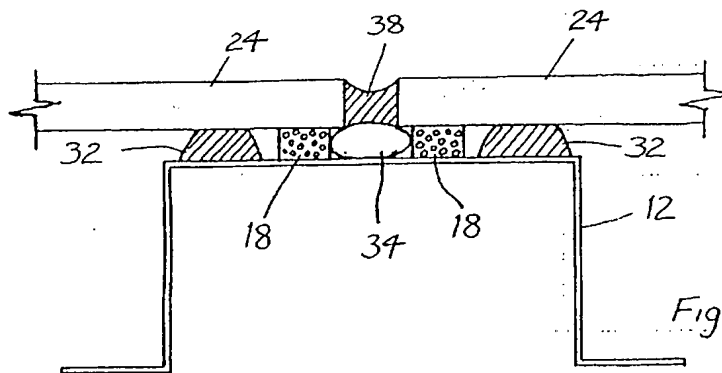


Fig. 8